12. $f(z) = z^{10} - 4z^6$ 일 때 $f\left(\frac{1+i}{\sqrt{2}}\right)$를 계산하라.

$$f\left(\frac{1+i}{\sqrt{2}}\right) = \left(\frac{1+i}{\sqrt{2}}\right)^{10} - 4\left(\frac{1+i}{\sqrt{2}}\right)^6$$

$$= \left(e^{i\frac{\pi}{4}}\right)^{10} - 4\left(e^{i\frac{\pi}{4}}\right)^6$$

$$= e^{i\frac{5\pi}{2}} - 4\left(e^{i\frac{3\pi}{2}}\right)$$

$$= e^{i\frac{5\pi}{2}} - 4e^{i\frac{3\pi}{2}}$$

$$= \left(\cos\frac{5\pi}{2} + i\sin\frac{5\pi}{2}\right) - 4\left(\cos\frac{3\pi}{2} + i\sin\frac{3\pi}{2}\right)$$

$$= \left\{\left(\cos\left(2\pi + \frac{\pi}{2}\right) + i\sin\left(2\pi + \frac{\pi}{2}\right)\right) - 4(0 + i(-1))\right\}$$

$$= \left\{\left(\cos\frac{\pi}{2} + i\sin\frac{\pi}{2}\right) - 4(-i)\right\}$$

$$= (1+0) + i(0+(-1)) + i4$$

$$= -1 - i + i4$$

$$= -1 + i3 \quad ??$$

$$\frac{1+i}{\sqrt{2}} = \frac{1}{\sqrt{2}} + i\frac{1}{\sqrt{2}}$$

$$= \cos\frac{\pi}{4} + i\sin\frac{\pi}{4}$$

$$= e^{i\frac{\pi}{4}}$$

Good !!

$i + i4 = i5$